PART 5

LM FOOD CHAIN

Chapter 2. Recommendations

Through the course of the development and calibration of the food web models, every effort was made to make full use of available information and to make necessary simplifications and assumptions to achieve a balanced progress without sacrificing the overall quality in the food web modeling. The models described in this part was believed to represent the best available knowledge for the management of congener-specific PCB contaminants in Lake Michigan food webs. However, additional works are needed to further improve the validation and to test the applicability of the models to other hydrophobic chemicals. There are also research needs that we believe are essential for the improvement of the performance of the fish models.

5.2.1 Additional Model Validations

Additional model validation should be conducted once sufficient new field data sets become available. One of the additional model validation would be to test the validity of the models for PCB concentrations in Lake Michigan food webs after 1994-1995. This exercise would include calculating PCB concentrations in fish using the new field data collections of PCB concentrations in water and sediment, comparing the model calculated data with actual measured PCB concentrations in fish, and evaluating model performance in reproducing future PCB concentrations in Lake Michigan fish.

Apparently, model validation is a continuous process. Each validation exercise only addresses model performance under a set of specific conditions or to a type of application. For example, the aforementioned validation exercise, once achieved, indicates that the models can be used as a practical tool to make quantitative prognoses about PCB contaminants in particular Lake Michigan food webs.

In order to test models' applicability to other chemicals, model validation can also be extended to *trans*-nonachlor in Lake Michigan. There are adequate field data sets available to carry out this validation study. The values of chemical-specific model parameters for *trans*-nonachlor can be deduced from the correlations between parameter values and log K_{ow} values of the contaminants, which were established based on model calibrations for PCB congeners.

5.2.2 Model Applications

It is desirable to examine the capability of the fish models to reproduce archived fish PCB data for Lake Michigan. This can be done with the reconstruction of historical PCB concentrations in water and sediments by a fate and transport model (such as the LM2-Toxic) based on dated sediment core profiles for PCBs. Model estimates of past PCB concentrations in various fish species can then be made from the reconstructed concentrations in water and sediments. Once completed satisfactorily, the results of this model study may provide a better baseline for PCB load reduction analysis.

5.2.3 Future Improvements

The following were some of the research needs identified to be important for the improvement of the model quality.

A. Additional studies for the refinement of bioenergetic information and growth data for species in lower trophic levels of the food webs, such as zooplankton, *Mysis*, deepwater sculpin, and slimy sculpin in Lake Michigan.

B. Field measurement of the moisture contents of zooplankton, *Mysis*, and *Diporeia* at each biota zone in Lake Michigan. These data will help reduce model uncertainty associated with erroneous estimates of water content while converting dry weight-based data to wet weight-based.

C. More studies on correlations between the chemical assimilation efficiency and K_{ow} values of the chemicals, and on species dependency of the chemical assimilation efficiency.

D. Investigation of possible PCB metabolism in Lake Michigan fish, and the kinetics of the processes.

E. More data collections for possible refinement of the model descriptions for fish dietary compositions in Lake Michigan.